Botanical papers at the Washington meeting of the A. A. A. S.

At this meeting, beginning August 19, an unusually large number of botanical papers were presented, of which we give the following abstracts:

The possibilities of Economic Botany: the address of the retiring president of the association, DR. GEORGE L. GOODALE.— The address was introduced by a brief description of the speaker's recent trip through Australasia and Japan, where many of our possible economic plants were met. Many examples were given of the useful plants which mankind may hope to employ in the near future. The assertion was made that if all our present cereals were swept out of existence our experiment stations could probably replace them by other grasses within half a century, the methods being selection and hybridization. New vegetables may reasonably be expected from Japan, a country whose flora has such remarkable resemblance to our own. The fruits of the future will tend more and more toward becoming seedless, just as certain fruits are now. All the great groups of economic products were taken up in turn and their possible improvement described. The speaker urged the importance of the establishment of a series of gardens in different parts of the country, where experiments can be carried on in hybridizing and selection, and expressed the opinion that such establishments should be neither governmental nor academic. A complete abstract of the address is not possible, as it was a collection of facts that cannot be condensed. The paper will be published in full in the *Am. Jour. of Science* for October, and also, translated into German, in the Pharmaceutische Rundschau. It is an exceedingly valuable contribution to the literature of Economic Botany.

Illustrations of heredity in plant hybrids: DR. J. M. MACFARLANE, of Edinburgh University.— This address was the public lecture of Friday evening and was fully illustrated by the use of three lanterns, showing side by side the structures of each parent and the hybrid. The points made were as follows: Some hybrids are exactly intermediate in histological details between parents. Parents in such cases are nearly related histologically and the progeny often fertile. Some

hybrids while intermediate in most details inherit two diverse structures peculiar to each parent. Such hybrids are usually largely sterile. Effects of heredity were traced in flowering period, color, chemical constitution and powers of resistance, showing that an organism is normally an equal blending of both parents. Explanation was offered of cases where the offspring resembles one parent rather than another.

The future of Systematic Botany: JOHN M. COULTER.—The vice-presidential address is printed in full in this issue.

The botanical papers before section F were as follows:

On the structure and dimorphism of Hypocrea tuberiformis *B. & Rav.:* GEO. F. ATKINSON.—H. tuberiformis was described by Berkeley in *Grevillea*, 4. 13, from specimens collected by Ravenel in S. C. It was also distributed in Rav. Fung. Am. n. 733, and in Rav. Fung. Car. n. 52. The perfect stage has never been described. Patouillard described a new genus *(Dussiella)* from specimens of a fungus in the Berlin Museum, which was wrongly determined as *Hypocrea tuberiformis* B. & Rav. It was collected in Caracas and is very different from the American specimens on Arundinaria, the perithecia being entirely immersed in the stroma and accompanied by paraphyses, while in the American specimens the perithecia are sessile and stand on the stroma "like the young horns of Podosma macropus." The fungus is closely related to Epichloe, but as the stroma does not entirely surround its host it would fall into the genus unnecessarily erected by Saccardo, and for the time being would read *Hypocrella tuberiformis* (B. & Rav.).

The spectroscope in botanical studies: I. A. BRASHEAR.—A simple method of studying the selective absorption and reflection of flowers and leaves by means of the spectroscope was suggested. The author gave the results of a number of studies on the colors of flowers and leaves, illustrating results by means of diagrams.

On the prothallium and embryo of Osmunda Claytoniana and O. cinnamomea: DOUGLAS H. CAMPBELL.—The author treated at length the structure and germination of the spores, the development of the prothallium, the structure and development of the sexual organs, fertilization, the development of the embryo with comparison in the two species; closing with

a comparison of the development with that of other Pteridophytes, and a discussion of the systematic position of the Osmundaceæ.

On the phylogeny of the Archegoniata: DOUGLAS H. CAMPBELL.—In this paper, in a certain sense a sequel to the preceding, Dr. Campbell detailed the different views held as to the relation of Hepaticæ and Musci to each other and to the Pteridophytes, and stating the hypothesis as to the primitive nature of the Eusporangiate Pteridophytes, the author claimed an evident inter-relationship of the different groups of the Hepaticæ, showing the connection between the thallose and foliose Hepaticæ, and between the former and the mosses. A comparison of the Pteridophytes and Hepaticæ was followed by a consideration of the relationships of the Pteridophytes *inter se*, of heterospory among the Pteridophytes, and of the relation to Gymnosperms and Angiosperms.

Further observations on a bacterial disease of oats: B. T. GALLOWAY.—After a brief review of the paper read on this subject at the Indianapolis meeting, the life history of the organism was set forth, it being shown that the germ may pass the winter on seed from diseased plants, on volunteer oats and to a limited extent in the soil. The characteristics of the germ as regards its behavior on different culture media were given, together with the results of inoculation experiments. In conclusion the experiments in combating the disease and the results obtained were given.

A new Nectria: B. D. HALSTED.—The stem rot of sweet potato is a puzzling disease. As the decay begins near the surface of the ground, and works in opposite directions, usually several fungi are found in the affected parts. A species of Fusarium is uniformly abundant upon the aerial decaying stems. Early in June an ascigerous fungus was found upon the underground portions of the young plants and was first thought to be a form of black rot. It is, however, a Nectria and somewhat closely related to *Nectria Vandæ* Warh.

Notes upon bacteria of Cucurbits: B. D. HALSTED.—Melons, squash and cucumber plants have suffered from a bacterial disease during the present year in New Jersey. The stem decays near the ground and the leaves wilt and "melt" away. The germs are oval in shape and inoculations of healthy plants were successfully made by means of a flamed

glass rod. In like manner the disease can be introduced into the stems and leaves of various species of cucurbits. The same bacteria develop with rapidity in ripe tomato fruit upon the vines and spread through the stems of the inoculated plants.

Another chapter in the history of the Venus' Fly-Trap: J. M. MACFARLANE.—It was shown that for mechanical stimulation of leaf *two* touches are needed to cause contraction (unless the stimulus be very powerful), separated by a greater interval than $\frac{1}{3}$ of a second. If less than $\frac{1}{3}$ of a second elapses, there is no contraction and a third touch is then needed. In the first case no effect is produced if 35–40 seconds elapse between stimuli. By repeated stimuli, with intervals of 40 seconds between, the protoplasm becomes fatigued, so that when the time interval is reduced sluggish movement is exhibited. All parts of the lamina are sensitive to surface stimulation. The author claimed that the explanation of the behavior to stimulating and non-stimulating bodies is to be found in the tetanus of the leaf, first produced by mechanical and later by chemical stimuli. The behavior in this respect of numerous organic and inorganic substances was noted, as was also the agreement of these with Burdon-Sanderson's electrometer results. The nature of the digestive excretion was considered, together with the structure of the leaf in relation to contraction and excretion. The author, in concluding, claimed a perfect parallelism between combined nerve and muscular action in animals, and contraction action in Dionæa. The paper was illustrated by testing the observations made upon some magnificent Dionæas, obtained from the government Botanic Garden.

The Compositæ collected by Dr. Edward Palmer in Colima: J. N. ROSE.—Of the 515 species of plants collected by Dr. Palmer in the State of Colima, 61, or about 12 per cent., are Compositæ. Among these were six new species and two new genera, together with a number of rare forms, some of which had not been collected for more than 100 years.

The Flora of Carmen Island: J. N. ROSE.—This contained a sketch of the collections made in this island by Dr. Edward Palmer in 1870 and in 1890, Dr. Palmer being the only collector who has ever visited the locality. The total number of species obtained was 70, and of these six are new. Group-

ing the plants into Polypetalæ, Gamopetalæ, Apetalæ, and Endogens, it was found that of polypetalous forms there were 21 species, 7 of which were Leguminosæ; of gamopetalous 24 species, 12 of which were Compositæ; of apetalous 10 species, 6 being Euphorbiaceæ, and of endogens 13 species, 12 being Gramineæ. Twenty-nine of the species have been reported from Mexico and forty-nine from Lower California.

Uses of the fermentation tube in bacteriology: THEOBALD SMITH.—The object of the paper was to call attention to the value of the fermentation tube in the differentiation of closely allied species or varieties of bacteria, in the preliminary study of gas production and in the cultivation of anaerobic forms. It was also shown to be very useful in the class room in demonstrating the very active metabolism of bacteria as indicated by the rapidity of gas production.

Botanical field work of the Botanical Division: GEORGE VASEY.—This paper gave an account of the field work or botanical explorations which are being conducted by the Botanical Division of the Department of Agriculture. The sketch included an account of the work in Texas, with a list of new species; the bulletin of the Texas Flora; the work in Arizona and in Mexico, with an account of some species of special interest; the Death Valley Expedition; the special investigations in Cactaceæ; the explorations in Indian territory, N. E. Minnesota and Wisconsin, and in Florida.

Results from recent investigations in pear blight: M. B. WAITE.—Pear blight is a disease which works only in meristematic tissue. After explaining twig and blossom blight and detailing methods of study the writer gave some of the characteristics of the germ blight. It is a motile bacillus. The blight bacteria grow in the nectar and multiply there as saprophytes and then enter the tissues. The bacillus of blight in the nectar is carried from flower to flower by insects visiting the flowers for pollen and honey. An artificial epidemic of pear blight was started by infecting a few trees on the edge of an orchard and allowing free access of insects. Protecting the flowers from visits of insects will protect from blight.

In addition to the above papers, the four following were presented, by appointment at the Indianapolis meeting, under the general title of *Plant Physiology*.

Transpiration, or the loss of water from plants: CHARLES E. BESSEY and ALBERT F. WOOD.—The historical summary of the investigations upon transpiration was followed by a discussion of the methods of observation and the nature of transpiration. The paper closed with a summary of the views of the principal investigators.

Absorption of fluids by plants: L. H. PAMMEL.—The paper opened with a résumé of the work upon the absorption of fluids by plants, considered historically, anatomically and physiologically. The subject of soils was then considered as bearing upon the absorption of water. The distribution and occurrence of root hairs on plants with an exposition of the way in which absorption was brought about was then discussed, the paper closing with an account of the absorption of fluids by Cryptogams.

Movement of fluids in plants: W. J. BEAL.—The author gave a résumé of the subject, speaking chiefly of the movement of fluids in trees. His remarks were confirmed by a number of experiments that he had performed for verification.

Gases in plants: J. C. ARTHUR.—The writer gave a brief historical statement of the discovery of the principal facts pertaining to the subject; the kinds and origin of gases in plants; and an account of the present state of knowledge regarding the movement and distribution of gases in plants.

Two papers of botanical interest were read before section C (Chemistry).

The biological function of the lecithins: WALTER MAXWELL.—In a paper presented before the association in 1890, it was shown that during the initial stages of plant growth, the phosphorus contained in the mature seed as a mineral phosphate, under the action of the process of germination, becomes separated from the inorganic compound and reappears in the organisms of the young plantlet in an organic form as lecithin, and that the lecithins form a medium through which the element phosphorus passes from the mineral to the vegetable kingdom. A continuance of the study of the functions of the lecithins, which has been conducted with the normal hen's egg and the incubation products of the egg, have indicated that the phosphorus contained in the egg in the organic form as a lecithin, under the action of the process of incubation, becomes eliminated from the lecithin compound

and reappears in the mineral form as a phosphate, and is utilized in the production of animal bone. It thus appears that the lecithin bodies are a channel through which the circulation of the element phosphorus is conducted, passing from the mineral, through the vegetable and into the animal kingdom.

Raphides the cause of the acridity of certain plants: H. A. WEBER.—Chemical tests show that the reason why some plants, like Arisæma, are acrid, while others also abundantly supplied with raphides, like Tradescantia, are not acrid is because the latter have the bundles of raphides surrounded by an insoluble envelope, not present in the former. In the one case the raphides are readily dissolved in the mouth and produce the biting sensation; in the other case they do not dissolve and consequently cannot be tasted.

Botanical Club of the A. A. A. S.

The meetings of the club were held from 9 to 10 A. M., on Thursday, Friday and Saturday of the session of the Association. They were well attended, quite as well in fact as the Section of Biology which followed later in the day. The number of papers presented was unfortunately limited by the brief sessions, but they were of more than usual interest. The following is a summary of the papers read:

Remarks on some apparatus upon exhibition: J. C. ARTHUR.—A brief description of respiration apparatus exhibited by Dr. Atkinson and himself, and also of some other pieces of physiological apparatus. A student's reagent case was also exhibited by Prof. Beal.

The perfect stage of Cercospora gossipina: GEO. F. ATKINSON.—An account of further studies upon the life history of this parasitic fungus.

Notes on egg plant diseases: B. D. HALSTED.

Distribution of some fungi: L. H. PAMMEL.—A record of the occurrence of some parasitic fungi during 1891. In discussion Prof. L. H. Bailey expressed the opinion that by